

Remarks

By the foregoing amendment claim 1 has been amended to specify the apparatus comprises a control means interconnecting the sensor means and drive means which is adapted to receive the contact signal as a sole input signal and generate a control signal to the drive means to adjust reciprocating movement of the piston wherein the sensor means, drive means and control means are connected in series. Claim 2 has been cancelled and claim 3 has been amended to depend from claim 1. Claim 8 has been amended to indicate control means responsive to the first signal to generate a second signal from said first signal as a sole input signal. The amendment of claim 1 and claim 8 is supported by the original claims and page 3, lines 19-24 and the Figure in the application.

Reconsideration of the rejections of record in view of the amended claims is respectfully requested.

Claim 1-8 have been rejected under 35 U.S.C. §103(a) as being unpatentable over BR 9901136 to Yang. Before discussing the differences and deficiencies of this reference a brief review of the independent claims is in order. Amended independent claim 1 specifies an apparatus comprising a cylinder having opposed ends, a piston disposed for reciprocating movement between the opposed ends of the cylinder, drive means connected to the piston for providing the reciprocating movement of the piston, sensor means in communication with said cylinder for sensing any contact of said piston and said opposed ends, and generating a contact signal representing said contact, control means interconnecting said sensor means and said drive

means, the control means adapted to receive said contact signal as a sole input signal and generate a control signal to said drive means to adjust reciprocating movement of the position, wherein the sensor means, drive means and controller are connected in series.

Amended independent claim 8 specifies a system for controlling a reciprocating apparatus having a cylinder, a piston adapted for reciprocating movement in the cylinder, and a driver for moving the piston, the system comprising sensor means mounted to said cylinder for generating a first signal representing contact between the piston and the cylinder, and control means interconnecting said sensor means and the driver, the control means responsive to the first signal to generate a second signal to the driver from said first signal as sole input signal to control movement of the driver and the piston, wherein the sensor means, drive means and control means are connected in series.

In contrast Yang discloses an apparatus and system which includes a driving unit connected in parallel with stroke computation unit 800. Yang controls movement of the piston by voltage control which drives the compressor in accordance with the stroke determined by the microcomputer based on a control destination stroke (col. 3, lines 45-62). There is no teaching or suggestion in Yang of an apparatus in which a control means generates a control signal to control movement of the piston using a contact signal solely as an input signal as in the claimed invention. Accordingly, Yang fails to disclose or suggest the claimed invention.

Claims 1-8 have also been rejected under 35 U.S.C. §103 as being unpatentable over Matsumura et al. JP 11-324911 in view of Yang. Matsumura et al.

discloses the use of a displacement sensor and a control circuit which is responsive to position data.

According to the English translation of Matsumura et al.'s abstract, displacement sensor 4 is used for detecting the position of a piston. A control circuit 5 is used to form the current command value in response to position data obtained from the sensor signal processing circuit 6. The control circuit has large and small excess judgment references about the position of the piston between the upper dead point position as a target of the control and predetermined limit position. When the piston exceeds the excess judgment reference, the control circuit lowers the current command value more than the case in which the piston portion exceeds the small judgment reference.

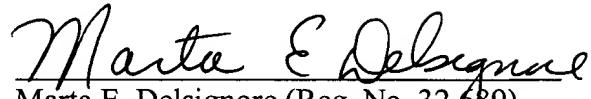
A computer translation of the Matsumura et al. patent obtained from the Japanese Patent Office website is provided for the Examiner's convenience in the enclosed Information Disclosure Statement. As indicated in paragraph [007] on page 1-2 of the Detailed Description, Matsumura et al. teaches the apparatus disclosed therein provides that "the collision of a piston is avoided certainly." There is no detection of contact of a piston with opposed ends. There is no reason why one skilled in the art would be motivated to modify Matsumura et al.'s device from a displacement sensor to that of a sensor for sensing contact of the piston and an end wall, much less provide a control circuit which is responsive to that contact signal to control the position of the piston.

Accordingly, neither Matsumura et al., alone or in combination with Yang, renders the claimed invention obvious.

In view of the foregoing claims 1, 3-8, all the pending claims, are in condition for allowance.

Prompt and favorable action is respectfully requested.

Respectfully submitted,


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